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Profitability of Eucalyptus growing in Busiro, Mpigi District, Uganda

W.S. Gombya-Ssembajjwe
Department of Forestry, Makerere University
P.O. Box 7062, Kampala.

Abstract

The demand for forest products, such as wood for construction, fuel and furniture-making is ever increasing; yet the supply of woody products from the existing forest resources is decreasing. In addition to government's effort to encourage farmers to grow forest trees, farmers need to be assured that their investments in forest tree growing is worthwhile. The paper examines the worthiness of investments in eucalyptus growing with the view of advising farmers on forest tree growing using empirical evidence. It is based on data collected over a period of four years (1993-1997) from three eucalyptus farmers found in Busiro County, Mpigi District. The worthiness of investments in eucalyptus growing has been determined using the net present value (NPV) criterion. It has been proved that investments in eucalyptus growing in perpetuity (forever) and being harvested on a four (4) year rotation period can earn a present value of a perpetual periodic annuity of Ug. shs 4,553,162.

Key words: Household level investments; Eucalyptus; financial profitability.

Introduction

For a long time in Uganda natural forests have been supplying the country with its required woody products. Unfortunately, these resources have been depleted to a greater extent by agricultural encroachment, pit-sawing, fuelwood harvesting, (Gombya-Ssembajjwe, 1996) as well as harvesting for saw-mills (Carvalho and Pickles, 1994). Recently, large parts of natural forests have been transferred to National Parks. Of the remaining productive natural forest reserves, 50% has been made Nature Conservation Reserves, implying non-consumptive usage only.

Farmers in Uganda just like elsewhere do make rational decisions after making some cost benefit analysis in their own way. At the individual household levels investment decisions are made with a single clear objective of profit maximisation. Such an objective requires that investments produce surplus of total revenues over total costs. Therefore, the major elements of profitability are revenues (and positive/incoming cash flows), costs (expenditures, negative outgoing cash flows); and financial analysis rather than economic analysis is used to decide which investment. is financially more profitable than the other.

Due to increased demand for forest products, e.g. wood for reconstruction taking place in the country during this decade, and fuel wood for both domestic and industrial purposes, the supply of woody products from the existing forests has fallen short of what is demanded. Following the market forces , the price for woody products has risen making tree growing a lucrative business. As such, many farmers have invested or are willing to invest money in forest tree growing. The government of Uganda through its Forest Department has been and is still encouraging individual farmers to invest in commercial forest tree growing. However, there are more farmers who are still asking if commercial growing of forest trees is a profitable venture. The objective of this study was to prove to farmers that investment in eucalyptus growing is financially worthwhile.

Conceptual framework

It has been observed that farmers in Uganda prefer eucalyptus (*kalitunsi*) tree species to other forest tree species. There are several reasons for this, some of which are silvicultural in nature while others are of economic considerations. The most common reasons given by farmers for growing eucalyptus are:

a) shorter growing periods (rotations) compared to other trees,
b) coppicing capacity, and
c) ready market for the tree products.

The shorter growing period (3-8 years), depending on the objective of management, means that the investors are able to get returns on their investments in a shorter period. Coppicing means that investors get costless regrowth crop. However, it should be noted that coppice management is often complicated by loss of vigour over several cutting

cycles. These two reasons call for the use of high discount rates which make the profitability of the coppicing crop very high.

Pricing investment costs and revenues. Underlying financial analyses is an assumption that market prices reflect value, or can be adjusted to do so (Dasgupta and Pearce, 1978; Gittinger, 1982). In a 'perfect' market - one that is highly competitive, with many buyers and sellers, all of whom have perfect knowledge about the market, the market price reflect the value of the commodity being marketed. The price of every economic good would exactly equal the value that the last unit utilised contributes to production. If a unit of goods could produce more satisfaction in some activity other than its present use, someone would have been willing to bid up its price, and it would have been attracted to the new use. When this price system is in 'equilibrium', the marginal value product, the opportunity cost and the price will all be equal (Gittinger, 1982).

Markets are not perfect and are never in complete equilibrium. Hence, prices may reflect values only imperfectly. In Uganda, markets are also characterised to a large extent by the very limited purchasing power of the average consumer. A wider range of consumer goods vie for the buyers' money and preference, which is more often oriented to the cheapest. In turn, the enterprises compete to produce at the lowest cost in the market, sacrificing the quality aspect. For example, it has been observed that some of the planting materials are from 'poor' sources and therefore the final products, e.g. timber and poles might not be of good quality. Yet farmers are likely to be attracted to such planting material as their market price is lower than planting material from 'good' sources.

Revenues. Revenues are the positive cash flows. The major source of revenue for a commercial forest tree growing enterprise is the sale of standing or harvested trees. The ultimate source of revenue is demand from consumers for the final product as expressed in willingness to pay the market price for the products.

The demand for forest tree products in Uganda, like elsewhere, may be affected by a number of factors. For example, quantities normally bought at a particular price increase usually proportionally with human population; and quantities of woody forest products marketed are likely to increase with increasing national income as people with income surplus are likely to spend some of it on furniture, housing construction, etc. Also, a growing taste of consumers for wooden products might increase demand for wood. The availability of substitutes for forest tree products (e.g. paraffin, electricity) may reduce the demand for fuelwood, while complementary products (e.g. cement, increased transmission service) may increase demand for timber in the construction industry and transmission poles respectively. Lastly, the economy of Uganda is just recovering from an economic recession, and so the construction industry, a major consumer of wood, is very active as compared to periods of recession when the construction industry was more depressed than the overall economy.

Methodology

This paper is based on data that have been collected over a period of four years, involving three eucalyptus farmers, namely the Kisubi Brothers of Christian Instruction, whose eucalyptus woodlot is situated in Kikusa, Namulanda, Ssisa, Busiro; the Nyanzi family whose woodlot is found in Namagoma, Nabingo, Nsangi, Busiro; and the Gombya-Ssembajjwe family whose woodlot is found in Wamala, Ssisa, Busiro. Data were complied mainly on costs, productivity and revenues on a per hectare basis over a period of four years and results have been presented in Tables 1 and 2. The costs and revenues were discounted to take into account the time value of money and also for comparison purposes. The productivity of any forest stand or woodlot is affected by soil fertility of the site, genetic material of planting stock, tending operations, and spacing. From observations the first three factors were assumed constant, while spacing was considered as have having a direct effect on the number of building poles produced per ha.

Data analysis

Data was used to compute the present value (PV) of future payments from the investment in one hectare of eucalyptus in order to determine the profitability of such investments. Price (1989 & 1993) has defined discounting as any process of revaluing a future product, event, condition, or service to give a PV. While Dasgupta and Pearce, 1975; Gittinger, 1982; Harou,1987; Leuschner, 1987; Price, 1989 & 1993; Square and van der Tak, 1975; and UNIDO, 1978; have given a mathematical expression of discounting as:

$$PV = X_t/(1+r)^t \quad \text{.....i.}$$

Where,

X_t = cost or revenue expressed t years after some reference date,

PV = present value of X_t discounted to that reference date,

r = discount rate (rate of interest),

$1/(1+r)^t$ = discount factor.

For highly profitable short-rotation tree crop like eucalyptus, it has been suggested by Price (1989) that PV be calculated as a perpetual series of rotations rather than profit on a single rotation. Leuschner (1987) gave the formula for calculating the present value of a perpetual periodic annuity as:

$$SA_o = a(1.0/((1.0+r)^n - 1.0)) \quad \text{.....ii.}$$

Where,

SA_o = the present value of a perpetual periodic annuity,

a= the amount of annuity (net payment received after a every period),

r= discount rate (bank interest rate the investor would have earned),

n= number of years (e.g. rotation period) the annuity is paid.

Results and discussion

The costs and revenues identified in eucalyptus tree growing in the three woodlots studied are presented in Table 1 and 2. The average cost and revenues then have been used in determining the net periodic annuity, which was later used to compute the present value of a perpetual periodic annuity.

Precondition

The farmers have been using own savings to invest in eucalyptus growing, and had an alternative of banking their savings on a bank accounts where they would earn an interest of 10% per year. The Forest Department recommends a rotation of 4 years for quick and easy coppicing. At the end of that rotation the farmer can harvest trees which could produce posts, class II (10-15 cm) building poles, and firewood. The opportunity cost of growing trees instead of food crops has not been considered on the condition that all the three farmers claimed that their land had low agricultural crop yield so as to make crop production profitable.

The present value of a perpetual periodic annuity

At the end of the growing period of four years, the farmer is able to get on average an annuity of Ug. shs (4,615,416 - 2,497,666) = 2,117,750 per ha. The present value of a perpetual periodic annuity (SA_o) is then, 2,117,750 (1.0/ $((1.10)^4 - 1.0))$ 2,117,750 (2.15) 4,553,162.

The present value of a perpetual periodic payment from an investment in 1 ha. of eucalyptus woodlot, managed at a coppice rotation of four years is Ug shs 4,553,162. Since the figure is positive, then the investment is profitable at a rate of return of 10%. This means that every after four years a farmer with one ha. of land will be getting Ug shs 4,553,162. For a farmer who wishes to get the same amount of money on a yearly basis will need to harvest one ha. of land every year. Therefore, at least four hectares of land are required for woodlot establishment. A farmer wishing to get the same amount of money on a monthly basis will need at least 48 ha.

Normally investors are keen to know the rate of interest at which the investment will yield negative returns. In this case even at an interest rate of 100% the return (Shs 141,183) is positive thus indicating that negative returns are unlikely to occur on investments on eucalyptus.

Conclusions and recommendations

The analysis has indicated that in current conditions of costs, prices and productivity levels, eucalyptus growing in Busiro, Mpigi District is profitable. However, the farmer would make more profits by selling different products (posts, poles & firewood) of the tree instead of selling the whole tree as one product. As the demand for forest tree products increases while the supply from existing forest resources decreases, it is most likely that private individuals as well as firms will invest in forest tree growing. Therefore, I recommend to farmers having land having low crop yields to invest in eucalyptus growing instead.

Table 1. Summary of costs involved in eucalyptus tree growing.

Farmer	Location	Costs									
		Land	Clearing	Seedlings	Transport	Planting	Weeding	Potection	Harvesting	Overheads	Total
Kisubi Brothers	Namulanda	1,000,000	83,200*	112,500	—**	40,000	60,000***	246,800	350,000	880,000	2,772,500
Gombya	Wamala	1,000,000	460,000	186,000	150,000	155,000	246,000	154,000	250,000	150,000	2,751,000
Nyanzi	Namagoma	1,000,000	353,800	124,900	—**	70,000	14,000***	94,800	108,000	204,000	1,969,500
Total		3,000,000	897,000	423,400	150,000	265,000	320,000	495,600	708,000	1,234,000	7,693,000
Average		1,000,000	299,000	141,133	50,000	88,333	106,666	165,200	236,000	411,333	2,497,666

*Own a tractor used in ploughing, but costs are passed on to the overheads;
**Own transportation means, but costs are passed on to the overheads;
***Plant in agricultural crops and costs are passed on to such crops.

Table 2. Revenues obtained from tree sales on one hectare

Farmers	Rotation (years)	Spacing (m)	Trees per ha	Trees for sale (80%) of planting stock	Revenues	
					Per tree	Total
Kisubi Brothers	4	2x1.6m	3125	2500	3200*	8,000,000
Gombya	3	1.8x1.8m	3086	2469	1500	3,703,500
Nyanzi	4	2x1.4m	3571	2857	750	2,142,750
Total			9782	7826	——	13,846,250
Average			3260	2608	769.7**	4,615,416

*Sell different tree products (posts, poles and firewood) to the final consumer, thus adding value to the tree.
** This average is obtained by dividing the average revenue by the average number of trees sold.

References

Carvahlo, J. and Pickles, G., 1994. *Forest Industries Rehabilitation and Development Plan.* Seminar on forest management and sectoral development; integration of forest industries - markets. Makerere University, Kampala. March, 14-25,1994.

Dasgupta, A. K. and Pearce, D. W., 1975. *Cost Benefit Analysis; Theory and Practice.* The MacMillan Press Ltd., London, U.K.

Gittinger, J.P., 1982. *Economic Analysis of Agricultural Projects.* The John Hopkins University Press, Baltimore and London, US & UK.

Gombya-Ssembajjwe, W.S., 1996. *Analysis of Institutional Incentives for Sustainable Management of Tropical Moist Forests: A Case Study of Mengo Forests, Uganda.* Ph.D Thesis (in press), University of Wales, Bangor.

Harou, P. A., 1987. *Essays in Forestry Economics: Appraisal and Evaluation of Forestry Investment, Programs and Policies.* Kiel, Wissenschaftsverlag, Vank, Germany.

Leuschner, W.A., 1987. *Introduction to Forest Resource Management.* John Wiley & Sons, New York.

Price, C., 1993. *Time, Discounting and Value.* Blackwell, Oxford, U.K.

Price, C., 1989. *The Theory and Application of Forest Economics.* Basil Blackwell, Oxford, UK.

Squire, L. and Evan der Tak, H.G., 1975. *Economic Analysis of Projects.* The John Hopkins University Press, Baltimore, Maryland, USA.

UNIDO, 1978. *Guide to Practical Project Appraisal, Social Benefit Cost Analysis in Developing Countries.* UN, New York, US.